Science Update

Reaping More Rewards from Crop Residues

A 2-year study indicates that wheat and barley producers in Washington State's Palouse region have another potential tool to refine crop residue management to build soil organic matter, curb soil erosion, retain soil moisture, and maximize crop yields. Researchers tracked postharvest crop residues from 17 cultivars of winter wheat, 16 cultivars of spring wheat, and 9 cultivars of spring barley grown in 4 different locations in southeastern Washington to identify links between decomposition processes and fiber and nutrient characteristics of the straw.

The straw from the different cultivars had notable differences in fiber composition and carbon/nitrogen ratios. These characteristics also varied significantly by location. Fourteen percent of the cultivars had characteristics for slow residue decomposition and 14 percent had characteristics indicating a potential for rapid decomposition.

Crop residues decompose into soil organic matter, which provides nutrients to crops, limits erosion, and helps retain soil moisture. Rapidly decomposing cultivars are less likely to impede no-till seeding in higher rainfall areas where more straw is produced. *Ann Kennedy, USDA-ARS Land Management and Water Conservation Research Unit, Pullman, WA 99164-6421; (509) 335-1554, ann.kennedy@ars.usda.gov.*

Experimental Chickpeas Fend Off Caterpillar Pest

Chickpeas are high in protein, fiber, and other nutrients and are important legume crops the world over. Now new lines of pest-resistant chickpeas could put a halt to the damage from beet armyworm moth larvae, which like to eat the crop's leaves. The new chickpeas were conventionally bred from a cross between wild types with a broad range of insect resistance and cultivated types that have other good agronomic traits. In greenhouse trials conducted in 2006 and 2007, 28 to 62 percent of beet armyworms that fed on the leaves of the new chickpea cultivars died within a few days of hatching from eggs.

The worms that did survive were smaller and shorter than usual. The new chickpea lines were also more resistant to pests than the commercial cultivars currently grown by producers. Further testing is needed to assess how well the experimental chickpeas will fare in field production. *Stephen L. Clement, USDA-ARS Plant Germplasm Introduction and Testing Research Unit, Pullman, WA 99164; (509) 335-3572, stephen.clement@ars.usda.gov.*

ARS Scientists Help Sequence Genome of Potato Late Blight Pathogen

Researchers have sequenced the complete genome of *Phytophthora infestans,* the pathogen that caused the infamous Irish potato famine and the recent loss of potato and tomato crops in the eastern United States. A scientific team examined and annotated the genes in the pathogen that produce enzymes to degrade a plant's cell wall and found several groups of enzymes located in close proximity to each other.

When these enzymes attack the surface of a plant, they create an entry point where the pathogen can gain access to the plant's nutrients. Some evidence suggests that two enzyme groups may be active at the initial stage of the infection. The research team also provided the first report on a unique pattern of gene segments in the pathogen's genome that are called "introns." These genetic segments prompt production of different proteins from the same gene that attack different compounds within the plant cell wall. *Richard W. Jones, USDA-ARS Genetic Improvement of Fruits and Vegetables Research Unit, Beltsville, MD 20705; (301) 504-8395, richard.jones@ars.usda.gov.*

SCOTT BAUER (K5455-7)

Potato infected with late blight.

Reflective Particle Films Improve Apple Quality

Spraying apple trees with films that contain microscopic mineral particles may improve the color of the fruit and increase its weight. Researchers conducted a multi-year study in which sprayable particle films were applied strategically in an orchard of Empire apple trees.

The particle film's microscopic layer of mineral particles allows water and carbon dioxide to pass through the film. With some trees, an aluminized plastic film (ALF) was applied to the grass strip between the apple rows. With other trees, a sprayable particle-based reflective film (PF) was applied to the trees as well as the grass between the tree rows.

A third group of trees received no treatment. The ALF consistently improved apple color, while the PF increased red color in apples in 2 of the 3 years of the study. When PF was applied to the grass between tree rows, the average fruit weight was increased in all years of the study, compared to the untreated trees and those that received the ALF treatment.

The mechanism responsible for the increased fruit weight with the PF may be the altered light quality. This reflected light has enhanced far-red radiation that may have beneficial effects on both fruit color and fruit weight. *Michael Glenn, USDA-ARS Appalachian Fruit Research Station, Kearneysville, WV 25430; phone (304) 725-3451 ext. 321, e-mail michael.glenn@ars.usda.gov.*